DDC-T

MEMORANDUM FOR ALL DDC DEPOTS

SUBJECT: Inventory Valuation Statistical Sample Inventory

The working capitol fund (WCF) sample inventory is designed to measure the dollar value accuracy of the inventory. Attachment 1 outlines the Inventory Valuation Statistical Sampling plan. It also provides the sample size for the depots involved, not all depots will participate in the WCF sample inventory. The WCF sample inventory is scheduled to commence August 1, 1999 as TPIC "P" inventories. However, the DoD IG wants to be on site when the counts are performed. Because of the DoD IG audit, no TPIC "P" inventories will be released unless authorized by the DoD IG audit team or this office. After the WCF inventory has been released, a listing of all the items selected for the WCF sample inventory will be provided. This listing is to be used to monitor the WCF sample inventory to ensure all inventories have been completed for the entire sample. Items not completed will be reported to this office at the completion of the WCF sample inventory with an explanation of why the inventory was not completed.

The previous DoD IG audit of the Random Statistical Sample inventory to measure inventory accuracy, highlighted weaknesses in the physical count process. To ensure conformity in conducting the WCF sample inventory, procedures have been established and are provided as Attachment 2. These procedures include specific steps for completing the TPIC "P" inventories.

Because the WCF sample inventory is intended to measure the dollar value accuracy of material in stock, the only report generated from the sample inventory will be the DDC rollup. No individual depot reports will be available.

Questions may be directed to Mr. Brian Mackie, DDC-TO, DSN 977-4457, E-mail: bmackie@ddc.dla.mil, FAX DSN 977-5182.

JAMES O. RIMEL, SR.
Chief, Distribution Operations

Attachments

Defense Logistic Agency
Inventory Valuation Statistical Sampling Plan

I. Purpose

The Chief Financial Officer's Act (CFOA) of 1992 requires that the Department of Defense (DoD), the Military Services, and Agencies submit financial statements to Congress. One of the financial statement elements is the dollar value of on-hand supply inventory. As the wholesale provider of consumable items to the Military Services, the Defense Logistics Agency (DLA) manages four million items and maintains operational and war reserve inventories on many of those items. The purpose of this sample is estimate the dollar value of the dominant non-fuel portion of DLA owned and managed inventory.

II. Sampling Frame.

A. Population/units of analysis.

The sample will be taken against DLA sites operating under the Distribution Standard System (DSS). DLA has twenty sites operating under DSS, which store approximately 98% of the value of DLA's non-bulk fuel inventory. The selection of the DSS sites to be inventoried will be weighted towards sites with large inventory value. Record inventory balances will be taken from current DSS operating files. National Stock Number (NSN)-By-Location (all condition codes) will serve as the unit of analysis. All inventory items stored in DLA DSS sites which are countable and measurable and which are owned and managed by DLA Inventory Control Points (ICP), excluding bulk fuels and items transferred to the Defense Reutilization and Marketing Service (DRMS), will be included in the sample. Inventory value will be determined using the latest Mean Acquisition Unit Cost (MAUC) which will be obtained from the ICP Standard Automated Material Management System (SAMMS) operating files.

B. Sampling Time Frame.

The sample is to be conducted across all DSS sites from approximately August 1-31, 1999. This will allow sufficient time to have the samples verified by the sites, provide the results to DORRA for analysis, and distribute the information to DLA-FOX in time for CFO financial statements.

III. Point Estimate and Overall Sample Size.

Department of Defense (DoD) Regulation 7000.14, Volume 11B, Chapter 55 states: "…accounts are accurate with a 90% level of confidence and a precision level of + or – 2.5%." The sampling scheme in this plan will permit an estimation of the dollar value by which DLA record inventory is misstated. The misstatement combined with the dollar value of recorded inventory will allow for the dollar value of the sampled population to be estimated. To ensure stable point estimation and to satisfy the requirements for a 90% level of confidence and a level of precision within + or - 2.5%, a total of approximately 3000 NSNs will be sampled from among the 20 DLA DSS sites. Based on the sample size of the last Defense Business Operating Fund (DBOF) inventory valuation sampling, this sample size should provide more than sufficient coverage for initial inventory valuation sampling of DLA inventory.

IV. Two-staged, Random Sampling Design. A two-stage, stratified, random sampling procedure with replacement will be used to select NSNs for inventory.

A. First Stage: Sample Sites

In the first stage, DSS sites, the primary sampling units, are selected using Probability Proportional to Size (PPS) with replacement. Size is measured as record inventory dollar value. The record inventory for all DLA DSS sites (as of 30 June 1999) and the order in which they were randomly selected for inventory are shown in Table 1. – *DSS Site Inventory Value and Order of Selection*. The PPS with-replacement sampling methodology allows a primary sampling unit, or site, to be selected more than one time. Sites with greater inventory value are both more likely to be selected and to be selected more than once. The selection process is entirely random. Independent samples are generated for each draw of a selected site. This procedure was repeated until twenty sampling units had been selected.

Table 1. DSS Site Inventory Value and Order of Selection

Depot	Inventory Value (mauc)	Random Order of Selection
Tobyhanna	$9,075,025	
Anniston	$42,059,961	
Puget Sound	$67,516,910	
Corpus	$90,108,293	
Red River	$205,788,210	**9**
Cherrypoint	$251,582,355	**7**
Barstow	$261,843,415	**13**
Jacksonville	$261,263,501	
San Diego	$337,861,211	**4,16,18**
Albany	$404,359,825	**14**
Warner Robins	$445,687,622	**6**
Norfolk	$542,277,453	**2,15**
Hill	$539,564,929	
Oklahoma City	$698,727,601	**17**
New Cumberland	$706,795,782	**10,11,19**
Tracy	$923,804,556	**20**
Richmond	$964,368,461	**1,5**
Columbus	$378,490,544	
Mechanicsburg	$1,085,454,464	**8**
Sharpe	$1,113,678,668	**3,12**

B. Second Stage: Sample NSNs within DSS Sites.

In the second stage, NSNs specific to each site (excluding DRMS and non-DLA owned) are categorized at each site using the stratification scheme displayed in Table 2.- *Sampling Strata*. Since the value of countable items is less likely to be misstated than the value of measurable items, the stratification scheme separates the two qualitative dimensions. Countables are stratified further by NSN extended value to more precisely distinguish low dollar/high volume items from high dollar/low volume items.

Table 2. Sampling Strata

1. Measurables
2. Countables, Unit Price >= $0 and < $500 AND Extended Value <= $2,000
3. Countables, Unit Price >= $0 and < $500 AND Extended Value > $2,000
4. Countables, Unit Price >= $500 and < $1,000 AND extended value <= $10,000
5. Countables, >= $500 and < $1,000 AND extended value > $10,000
6. Countables, Unit Price >=$1,000 and < $50,000

Strata sample size determination

A stratum's population size and standard deviation of inventory adjustment dollar value are used to determine the optimum number of samples required of each stratum in order to obtain a stable overall point estimate. A minimum of one hundred fifty samples (m_j) will be taken from each site chosen for sampling in the First Stage. These samples are distributed across a site's strata using Neyman's Allocation. Neyman's Allocation is an efficient sample apportionment algorithm that allocates a larger portion of the sample to strata with large variances and a smaller portion to strata with small variances. A stratum's sample size at any given site is determined by the following formulation:

$$m_{ij} = m_i \left(\frac{M_{ij} s_{ij}}{\sum_{i=1}^{L} M_{ij} s_{ij}} \right)$$

where:
m_i= total number of samples allocated to site *j* (150)
m_{ij} =sample size allocated to the *i*th stratum at site *j*.
M_{ij}= Population size of the *i*th stratum at site *j*.
L= the number of strata

Note that the expression in parentheses represents the proportion of a site's sample allocated to each of its strata. This is referred to as the *Allocation Coefficient.* Summary statistics and sample size calculations for each of DLA's sites selected for sampling are shown in the Appendix. Except for the strata standard deviations, these data were taken from the 30 June 1999 DSS system files.

Strata sample sizes are largely a function of the product of a stratum's population and its variance (or, in this case, standard deviation). We have no direct knowledge from DSS of the expected magnitude of inventory misstatement. The standard deviations reported in the third column are estimates of standard deviations from the average strata misstated value. These estimates were obtained from a previous (Feb 99) DSS sampling of inventory record accuracy. The sample for each site was recoded to match the stratification for valuation sampling and the standard deviations of the inventory adjustment value for each strata was then computed. For some strata at some sites, especially those that have few high dollar items, an estimated standard deviation was not available. In these instances, an average strata standard deviation, computed from the entire DLA sample population, was substituted in its place.

The final column in table in the appendix ($\boldsymbol{m_{ij}}$) indicates the number of NSNs that will be randomly sampled from each stratum at each site chosen for sampling. In some cases, a stratum's allocation coefficient was so small that the
allocated no sample to it. To ensure satisfactory coverage across all strata, we "forced" five samples to be included in each stratum that was statistically allocated less than five. This could increase the sample size from the initially requested one hundred and fifty

V. Calculation of Results

Six intermediate calculations are used to calculate net inventory dollar misstatement:

1. The mean misstatement for stratum i at sampling unit (site) j is computed as follows:

$$\bar{y}_{ij} = \sum \frac{(BK - INV)}{m_{ij}}$$

Where:
BK = book value (record quantity * mean acquisition unit cost [MAUC])
INV = inventory value (inventory quantity * MAUC)
mij = sample size for stratum i, site j

2. The mean misstatement for sampling unit j equals:

$$\bar{y}_j = \frac{1}{M_j} \sum M_{ij} \bar{y}_{ij}$$

Where:

Mj = population of site j
Mij = population of stratum i, at site j

3. The point estimate of total misstatement at site j, then, equals:

$$\hat{Y}_j = M_j \bar{y}_j$$

4. The point estimate for the misstatement of the entire population is computed as follows:

$$\hat{Y} = \frac{1}{n} \sum \frac{\hat{Y}_j}{z_j}$$

Where:

n = the number of primary sampling units (sites)
Zj = probability of site j being selected for sampling, which is its book value as a proportion of the total book value summed across all sites.

A positive value for $\hat{Y}$ indicates the dollar amount by which the inventory value was understated; a negative value indicates the amount by which it was overstated.

5.The variance of population misstatement estimate equals:

$$\hat{s}^2_{\hat{Y}} = \frac{\sum (\frac{\hat{Y}_j}{z_j} - \hat{Y})^2}{n(n-1)}$$

6. The error bound for the population point estimate at a 90% level of confidence equals:

$$\pm 1.645 \sqrt{\hat{s}^2_{\hat{Y}}}$$

If the error bound is within 2.5% of the inventory book value, then the sampling will be considered to have met the regulatory requirement.

Finally, the sample results will be computed as follows:

Inventory Value = (Book Value + misstatement + error bound) and (Book Value + misstatement – error bound).

APPENDIX-

DLA INVENTORY VALUATION SAMPLE ALLOCATION

ALBANY					
strata	**M_{ij}**	**S.d.**	**M_{ij}(s.d.)**	**allocation coefficient**	**m_{ij}**
measurable	2,574	5,230	13,461,866	0.428	**64**
UP >0 and< 500, extval<2k	7,432	137	1,014,988	0.032	**5**
UP >0 and<500, extval>2k	2,534	5,886	14,914,719	0.474	**71**
UP>500and<1k, extval<10k	259	317	82,204	0.003	**5**
UP>500and<1k, extval>10k	54	3,732	201,537	0.006	**5**
UP>1kand<50k	295	6,034	1,780,054	0.057	**8**
total	**13148**		**31455367**	**1.000**	**158**
BARSTOW					
strata	**M_{ij}**	**s.d.**	**M_{ij}(s.d.)**	**allocation coefficient**	**m_{ij}**
measurable	1,958	293	573,342	0.005	**5**
UP >0 and< 500, extval<2k	41,784	152	6,351,586	0.051	**7**
UP >0 and<500, extval>2k	7,249	1,968	14,263,277	0.115	**17**
UP>500and<1k, extval<10k	4,195	569	2,385,906	0.019	**5**
UP>500and<1k, extval>10k	491	2,749	1,349,683	0.011	**5**
UP>1kand<50k	5,417	18,217	98,680,189	0.798	**119**
UP>50k	12	2,246	26,952	0.000	**5**
total	**1,958**		**123,630,936**	**1.000**	**163**

CHERRY POINT					
strata	**M_{ij}**	**s.d.**	**M_{ij}(s.d.)**	**allocation coefficient**	**m_{ij}**
measurable	1,047	47	49,335	0.007	**5**
UP >0 and< 500, extval<2k	28,501	36	1,014,351	0.143	**21**
UP >0 and<500, extval>2k	7,550	230	1,738,161	0.245	**36**
UP>500and<1k, extval<10k	2,367	122	289,082	0.041	**6**
UP>500and<1k, extval>10k	647	2,749	1,778,503	0.251	**37**
UP>1kand<50k	4,068	538	2,188,747	0.308	**46**
UP>50k	18	2,246	40,429	0.006	**5**
total	**44,198**		**7,098,607**	**1.000**	**156**
MECHANICSBURG					
strata	**M_{ij}**	**s.d.**	**M_{ij}(s.d.)**	**allocation coefficient**	**m_{ij}**
measurable	25,910	1,958	50,728,930	0.450	**67**
UP >0 and< 500, extval<2k	155,417	59	9,183,591	0.081	**12**
UP >0 and<500, extval>2k	31,943	1,408	44,980,855	0.399	**59**
UP>500and<1k, extval<10k	8,657	98	852,109	0.008	**5**
UP>500and<1k, extval>10k	1,535	1,425	2,187,099	0.019	**5**
UP>1kand<50k	9,496	513	4,873,917	0.043	**6**
UP>50k	10	2,246	22,460	0.000	**5**
total	**232,968**		**112,828,960**	**1.000**	**159**

NEW CUMBERLAND					
strata	**M_{ij}**	**s.d.**	**M_{ij}(s.d.)**	**allocation coefficient**	**m_{ij}**
measurable	10,212	62	628,140	0.012	**5**
UP >0 and< 500, extval<2k	194,610	41	7,901,166	0.156	**23**
UP >0 and<500, extval>2k	41,220	842	34,711,362	0.686	**102**
UP>500and<1k, extval<10k	4,700	317	1,491,731	0.029	**5**
UP>500and<1k, extval>10k	1,430	423	604,175	0.012	**5**
UP>1kand<50k	5,697	927	5,280,777	0.104	**15**
UP>50k	6	2,246	13,476	0.000	**5**
total	**257,875**		**50,630,827**	**1.000**	**160**
NORFOLK					
strata	**M_{ij}**	**s.d.**	**M_{ij}(s.d.)**	**allocation coefficient**	**m_{ij}**
measurable	8,853	27,750	245,669,688	0.770	**115**
UP >0 and< 500, extval<2k	118,881	81	9,662,648	0.030	**5**
UP >0 and<500, extval>2k	14,882	2,818	41,930,035	0.131	**19**
UP>500and<1k, extval<10k	12,883	464	5,983,896	0.019	**5**
UP>500and<1k, extval>10k	1,263	556	702,392	0.002	**5**
UP>1kand<50k	17,891	832	14,889,785	0.047	**7**
UP>50k	53	2,246	119,040	0.000	**5**
total	**174,706**		**318,957,483**	**1.000**	**161**

OKLAHOMA CITY					
strata	**M_{ij}**	**s.d.**	**M_{ij}(s.d.)**	**allocation coefficient**	**m_{ij}**
measurable	2,285	30,233	69,081,925	0.465	**69**
UP >0 and< 500, extval<2k	55,903	100	5,584,710	0.038	**5**
UP >0 and<500, extval>2k	17,041	642	10,934,869	0.074	**11**
UP>500and<1k, extval<10k	4,747	617	2,930,323	0.020	**5**
UP>500and<1k, extval>10k	1,263	3,236	4,087,561	0.027	**5**
UP>1kand<50k	8,079	6,932	56,003,870	0.377	**56**
UP>50k	44	2,246	98,826	0.001	**5**
total	**89,362**		**148,722,083**	**1.000**	**156**
RED RIVER					
strata	**M_{ij}**	**s.d.**	**M_{ij}(s.d.)**	**allocation coefficient**	**m_{ij}**
measurable	1,625	17	27,268	0.003	**5**
UP >0 and< 500, extval<2k	43,805	60	2,647,574	0.243	**36**
UP >0 and<500, extval>2k	8,814	388	3,417,188	0.314	**47**
UP>500and<1k, extval<10k	1,334	290	387,300	0.036	**5**
UP>500and<1k, extval>10k	425	2,749	1,168,259	0.107	**16**
UP>1kand<50k	1,439	2,246	3,232,050	0.297	**44**
total	**57442**		**10879639**	1.000	**153**

RICHMOND					
strata	**M_{ij}**	**S.d.**	**M_{ij}(s.d.)**	**allocation coefficient**	**m_{ij}**
measurable	10,591	464	4,916,130	0.004	**5**
UP >0 and< 500, extval<2k	369,393	3,314	1,224,002,175	0.913	**136**
UP >0 and<500, extval>2k	30,581	2,108	64,479,121	0.048	**7**
UP>500and<1k, extval<10k	17,044	378	6,440,416	0.005	**5**
UP>500and<1k, extval>10k	1,604	11,813	18,947,811	0.014	**5**
UP>1kand<50k	18,077	1,227	22,173,971	0.017	**5**
UP>50k	20	2,246	44,921	0.000	**5**
total	**447,310**		**1,341,004,546**	**1.000**	**168**
SAN DIEGO					
strata	**M_{ij}**	**s.d.**	**M_{ij}(s.d.)**	**allocation coefficient**	**m_{ij}**
measurable	3,226	12	38,583	0.002	**5**
UP >0 and< 500, extval<2k	58,161	41	2,377,040	0.107	**16**
UP >0 and<500, extval>2k	9,910	458	4,539,375	0.205	**30**
UP>500and<1k, extval<10k	6,025	317	1,912,272	0.086	**12**
UP>500and<1k, extval>10k	868	5,555	4,822,122	0.218	**32**
UP>1kand<50k	9,554	877	8,380,387	0.379	**56**
UP>50k	23	2,246	51,659	0.002	**5**
total	**87,767**		**22,121,437**	**1.000**	**156**

SHARPE					
strata	**M_{ij}**	**s.d.**	**M_{ij}(s.d.)**	**allocation coefficient**	**m_{ij}**
measurable	5,626	3,963	22,294,737	0.219	**32**
UP >0 and< 500, extval<2k	323,056	89	28,735,831	0.282	**42**
UP >0 and<500, extval>2k	43,659	569	24,862,054	0.244	**36**
UP>500and<1k, extval<10k	17,828	407	7,254,035	0.071	**10**
UP>500and<1k, extval>10k	2,762	230	635,205	0.006	**5**
UP>1kand<50k	19,432	926	17,988,980	0.177	**26**
UP>50k	23	2,246	51,659	0.001	**5**
total	**412,386**		**101,822,500**	**1.000**	**156**
TRACY					
strata	**M_{ij}**	**s.d.**	**M_{ij}(s.d.)**	**allocation coefficient**	**m_{ij}**
measurable	26,888	66	1,774,339	0.017	**5**
UP >0 and< 500, extval<2k	273,464	181	49,475,107	0.481	**72**
UP >0 and<500, extval>2k	34,658	937	32,463,802	0.315	**47**
UP>500and<1k, extval<10k	11,148	383	4,270,687	0.041	**6**
UP>500and<1k, extval>10k	1,451	1,884	2,733,568	0.027	**5**
UP>1kand<50k	12,553	970	12,170,636	0.118	**17**
UP>50k	18	2,246	40,429	0.000	**5**
total	**360,180**		**102,928,568**	**1.000**	**157**

WARNER ROBINS					
strata	**M_{ij}**	**s.d.**	**M_{ij}(s.d.)**	**allocation coefficient**	**m_{ij}**
measurable	1,426	2	2,809	0.000	**5**
UP >0 and< 500, extval<2k	70,018	72	5,020,991	0.116	**17**
UP >0 and<500, extval>2k	11,016	2,282	25,141,596	0.581	**87**
UP>500and<1k, extval<10k	6,067	317	1,925,602	0.045	**6**
UP>500and<1k, extval>10k	911	2,749	2,504,198	0.058	**8**
UP>1kand<50k	8,979	953	8,555,101	0.198	**29**
UP>50k	42	2,246	94,334	0.002	**5**
total	**98,459**		**43,244,632**	**1.000**	**157**

DDC Policy & Procedures
Working Capitol Fund Inventory
3rd Quarter FY99

1. Every effort will be made to complete the Working Capitol Fund (WCF) inventories (TPIC "P") in the allotted 30 calendar days. After 30 days, uncompleted inventories will remain in the workload bank to be released or cancelled as other workload permits. WCF inventories completed after 30 days will not be included in the computation.

2. All inventories will be completed by physically counting the material. A paper count, recording the on-hand balance from the QBL, is not an acceptable practice. Supervisors are responsible to enforce this policy. This is a very important issue; one the GAO auditors mentioned was not being followed at several depots during the audit of a prior sample inventory.

3. In order to ensure proper in-float consideration prior to the posting of a potentially incorrect adjustment, Depots will ensure the auto adjust tables in DSS are set to Zero prior to commencing the TPIC "P" inventories.

4. The only types of research to be completed before the acceptance of a count and therefore the processing of an inventory adjustment (gain or loss) are post-count and pre-adjustment research.

    - The post count validation is a comparison of the physical count with the recorded balance or a recount. The purpose is to ensure count accuracy. The research process should consider transactions that have occurred recently that may or may not be reflected in the physical count.

    - Pre-adjustment research is a review of the potential inventory adjustments due to differences between the count and the recorded balance. The purpose is to determine what the actual on-hand balance is and what, if any, inventory adjustment may be processed. As with post-count validation, in-float transactions and catalog data are the primary focus of the research.

5. Previous adjustments to the inventory will not be reversed in an attempt to avert a new adjustment with the current TPIC "P" inventory. Causative research will be perform only after the correct balance is determined and an inventory adjustment has been posted bringing the physical and recorded quantities into agreement.

6. TPIC “P” inventories may not be cancelled by the depot. Some TPIC “P” inventory cancellations may occur regardless, because catalog data changes in DSS will automatically cancel the TPIC “P” inventory. DDC-TO will monitor all TPIC “P” inventory cancellations to distinguish between the system generated cancellations from those cancelled by the Depot. DSS should reschedule the cancelled TPIC P inventories back into the workload bank.

7. When possible, inventory recounts (2nd and 3rd counts) should not be performed by the same individual who previously counted the material. Only qualified personnel assigned to the inventory section are authorized to make the determination to accept the physical counts processed that creates an adjustment.